

Amendment and Response
Serial No.: 09/888,732
Confirmation No.: 2092
Filed: 25 June 2001
For: RESPIRATOR VALVE

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Amendments to the Claims

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

Listing of Claims

1. (currently amended) A unidirectional valve comprising:
a valve body including a frame, a valve opening through the frame, and a valve seat
extending from the frame and at least partially surrounding the valve opening; and
a valve flap having a first portion attached to the frame and an adjacent second portion
free to move from a first position where the second portion is in contact with at least a part of the
valve seat to a second position where at least part of the second portion is spaced from the valve
seat, wherein the second portion of the valve flap comprises a first side spaced from a second
side and a first end proximate the first portion and a second end spaced from the first end,
wherein the valve flap thickness varies between the first and second sides further comprises a top
surface and at least one rib extending from the top surface of the valve flap, and further wherein
the valve flap thickness of a base part of the valve flap outside of the at least one rib decreases
when moving from the first end to the second end or from the second end to the first end.

2. (canceled)

3. (previously presented) The unidirectional valve of claim 1, wherein the valve flap has a
minimum thickness and a maximum thickness between the first and second sides, and wherein
the maximum thickness is at least about 10% greater than the minimum thickness.

4-6. (canceled)

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7. (currently amended) The unidirectional valve of claim [[6]] 1, wherein the at least one rib provides the valve flap thickness variations between the first and second sides.

8. (original) The unidirectional valve of claim 7, further comprising a plurality of ribs, wherein each of the plurality of ribs is spaced from each adjacent rib.

9. (original) The unidirectional valve of claim 1, wherein the valve seat is generally planar and the valve flap has a curvature that causes a bias of the valve flap toward the valve seat to provide a seal between the valve flap and the valve seat.

10. (original) The unidirectional valve of claim 9, wherein at least a portion of the curvature of the valve flap is at least partially flattened when the valve flap contacts the valve seat.

11. (original) The unidirectional valve of claim 9, wherein the bias of the valve flap toward the valve seat is sufficient to provide a seal between the valve flap and the valve seat in any orientation of the unidirectional valve.

12. (canceled)

13. (original) The unidirectional valve of claim 1, wherein the valve flap has a bottom surface that is generally planar and wherein the valve seat is generally nonplanar.

14. (original) The unidirectional valve of claim 1, wherein the frame of the valve body includes an angled portion adjacent the valve seat.

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15. (original) The unidirectional valve of claim 1, wherein the valve is an exhalation valve.

16. (original) The unidirectional valve of claim 1, wherein the valve is an inhalation valve.

17. (original) The unidirectional valve of claim 1, wherein the valve flap is removably attached to the valve body.

18. (currently amended) A respirator having a unidirectional valve, comprising;
a face mask having at least one opening for receiving a unidirectional valve; and
a unidirectional valve comprising:

a valve body including a frame, a valve opening through the frame, and a valve seat extending from the frame and at least partially surrounding the valve opening; and

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a valve flap having a first portion attached to the frame and an adjacent second portion free to move from a first position where the second portion is in contact with at least a part of the valve seat to a second position where at least part of the second portion is spaced from the valve seat, wherein the second portion of the valve flap comprises a first side spaced from a second side and a first end proximate the first portion and a second end spaced from the first end, wherein the valve thickness varies between the first and second sides flap further comprises a top surface and at least one rib extending from the top surface of the valve flap, and further wherein the valve flap thickness of a base part of the valve flap outside of the at least one rib decreases when moving from the first end to the second end or from the second end to the first end.

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19. (original) The respirator of claim 18, wherein the face mask is formed of a filtering material.

20. (original) The respirator of claim 18, wherein the unidirectional valve is an exhalation valve.

21. (original) The respirator of claim 18, wherein the unidirectional valve is an inhalation valve.

22-33. (canceled)

34. (currently amended) A unidirectional valve comprising:

a valve body including a frame, a valve opening through the frame, and a valve seat extending from the frame and at least partially surrounding the valve opening; and

a valve flap having a first portion attached to the frame and an adjacent second portion free to move from a first position where the second portion is in contact with at least a part of the valve seat to a second position where at least part of the second portion is spaced from the valve seat, wherein the second portion of the valve flap comprises a first end proximate the first portion, a second end spaced from the first end, a top surface, a bottom surface, and at least one rib extending from the top surface of the valve flap for at least a part of the distance from the first end to the second end, and further wherein the at least one rib is in continuous contact with the top surface of the valve flap.

35. (previously presented) The unidirectional valve of claim 34, wherein the valve flap thickness decreases when moving from the first end to the second end or from the second end to the first end.

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36. (previously presented) The unidirectional valve of claim 34, wherein the at least one rib comprises a plurality of ribs, wherein each of the plurality of ribs is spaced from each adjacent rib.

37. (previously presented) The unidirectional valve of claim 34, wherein the at least one rib extends from the first end to the second end.

38. (currently amended) A respirator having a unidirectional valve, comprising;
a face mask having at least one opening for receiving a unidirectional valve; and
a unidirectional valve comprising:
a valve body including a frame, a valve opening through the frame, and a valve seat extending from the frame and at least partially surrounding the valve opening; and
a valve flap having a first portion attached to the frame and an adjacent second portion free to move from a first position where the second portion is in contact with at least a part of the valve seat to a second position where at least part of the second portion is spaced from the valve seat, wherein the second portion of the valve flap comprises a first end proximate the first portion, a second end spaced from the first end, a top surface, a bottom surface, and at least one rib extending from the top surface for at least a part of the distance from the first end to the second end, and
further wherein the at least one rib is in continuous contact with the top surface of the valve flap.

39. (previously presented) The respirator of claim 38, wherein the valve flap thickness decreases when moving from the first end to the second end or from the second end to the first end.

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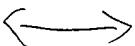
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40. (previously presented) The respirator of claim 38, wherein the face mask is formed of a filtering material.

41. (previously presented) The respirator of claim 38, wherein the unidirectional valve is an exhalation valve.

42. (previously presented) The respirator of claim 38, wherein the unidirectional valve is an inhalation valve.



43. (new) A respirator having a unidirectional valve, the respirator comprising;
a face mask comprising a valve opening; and
a unidirectional valve located over the valve opening, the unidirectional valve
comprising:
a valve seat surrounding the valve opening; and
a cantilevered valve flap comprising a first portion attached to the face mask
outside the valve seat, the valve flap further comprising a second portion located over the
valve seat, the second portion being free to move from a first position where the second
portion is in contact with the valve seat to close the valve opening to a second position
where at least part of the second portion is spaced from the valve seat to open the valve
opening, and wherein the second portion of the valve flap comprises a first end proximate
the first portion and a second end spaced from the first end, wherein the valve flap
thickness decreases when moving from the first end to the second end or from the second
end to the first end, and wherein the valve flap thickness is greatest proximate the first
end or the second end.

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44. (new) The respirator of claim 43, wherein the second portion of the valve flap comprises at least one rib extending from the top surface for at least a part of the distance from the first end to the second end.

45. (new) The respirator of claim 43, wherein the second portion of the valve flap comprises a first side spaced from a second side, and wherein the valve flap thickness varies between the first and second sides.

46. (new) The respirator of claim 46, wherein the valve flap has a minimum thickness and a maximum thickness between the first and second sides, and wherein the maximum thickness is at least about 10% greater than the minimum thickness.

47. (new) The respirator of claim 43, wherein the valve seat is generally planar and the valve flap has a curvature that causes a bias of the valve flap against the valve seat.

48. (new) The respirator of claim 47, wherein at least a portion of the curvature of the valve flap is at least partially flattened when the valve flap contacts the valve seat.

49. (new) The respirator of claim 47, wherein the bias of the valve flap toward the valve seat is sufficient to provide a seal between the valve flap and the valve seat in any orientation of the unidirectional valve.

50. (new) A respirator having a unidirectional valve, the respirator comprising;
a face mask comprising a valve opening; and
a unidirectional valve located over the valve opening, the unidirectional valve comprising:
a valve seat surrounding the valve opening; and

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a cantilevered valve flap comprising a first portion attached to the face mask outside the valve seat, the valve flap further comprising a second portion located over the valve seat, the second portion being free to move from a first position where the second portion is in contact with the valve seat to close the valve opening to a second position where at least part of the second portion is spaced from the valve seat to open the valve opening, and wherein the second portion of the valve flap comprises a first end proximate the first portion, a second end spaced from the first end, a top surface, and at least one rib extending from the top surface for at least a part of the distance from the first end to the second end.

51. (new) The respirator of claim 50, wherein the second portion of the valve flap comprises a first end proximate the first portion and a second end spaced from the first end, wherein the valve flap thickness decreases when moving from the first end to the second end or from the second end to the first end.

52. (new) The respirator of claim 50, wherein the second portion of the valve flap comprises a first side spaced from a second side, and wherein the valve flap thickness varies between the first and second sides.

53. (new) The respirator of claim 52, wherein the valve flap has a minimum thickness and a maximum thickness between the first and second sides, and wherein the maximum thickness is at least about 10% greater than the minimum thickness.

54. (new) The respirator of claim 50, wherein the valve seat is generally planar and the valve flap has a curvature that causes a bias of the valve flap against the valve seat.

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55. (new) The respirator of claim 54, wherein at least a portion of the curvature of the valve flap is at least partially flattened when the valve flap contacts the valve seat.

56. (new) The respirator of claim 54, wherein the bias of the valve flap toward the valve seat is sufficient to provide a seal between the valve flap and the valve seat in any orientation of the unidirectional valve.